



CREATING AIR REFUELING DOCTRINE:
PRESERVING EXPERIENCE IN WRITING

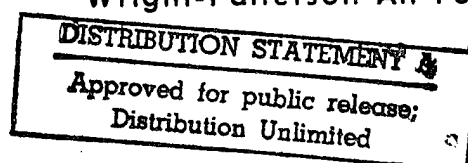
GRADUATE RESEARCH PROJECT

Daniel J. Monahan, Captain, USAF

AFIT/GMO/LAC/96J-6

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Wright-Patterson Air Force Base, Ohio



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GRADUATE RESEARCH PROJECT

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Master of Air Mobility

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Daniel J. Monahan

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Abstract

Without written operational air refueling doctrine, the difficulty of accurately estimating the utility and criticality of air refueling will continue. This paper describes the current state of air refueling doctrine and suggests a systematic approach for the establishment of a concise, dedicated, operational air refueling doctrine document. In an attempt to clarify mysterious doctrine terminology, working definitions and examples of doctrine are reviewed. Aerospace doctrine from 1941 to today is examined, illustrating how doctrine has evolved. A doctrine development process is suggested and air refueling historical experiences are analyzed in an attempt to develop basic doctrinal concepts. The doctrinal concepts derived (from the historical experiences) influence how tankers are employed today. A suggested doctrine development process is illustrated by applying a "doctrine process" model devised by Colonel Dennis Drew, USAF, Ret. Drew compares the doctrine development process in steps similar to those of written academic research and emphasizes the continuous nature of the doctrine process. The paper concludes that the Air Force can benefit from the creation of an operational air refueling doctrine document and makes specific recommendations for the establishment of an air refueling doctrine development process.

CREATING AIR REFUELING DOCTRINE: PRESERVING EXPERIENCE IN WRITING

I. Situation Overview

At the heart of warfare lies doctrine. It represents the central beliefs for waging war in order to achieve victory. Doctrine is of the mind, a network of faith and knowledge reinforced by experience which lays the pattern for the utilization of men, equipment, and tactics. It is the building material for strategy. It is fundamental to sound judgment. (26:21)

--General Curtis Emerson LeMay, 1968

General LeMay's concern for the development and preservation of doctrine facilitated the creation of the first AFM 1-1, *United States Air Force Basic Doctrine*, in August 1964. Along with Air Force Secretary Eugene M. Zuckert, General LeMay focused on the importance of meaningful doctrine and the promotion of future technology and its relationship to Air Force operations.

Secretary of the Air Force, Dr. Sheila E. Widnall, continues to emphasize the criticality of forward thinking and concise doctrine. Documents like *Global Presence* and *Air Force 2020* are aimed to focus beyond the immediate future (35:20). Air Force Chief of Staff General Ronald R. Fogleman stated that this is a time for the Air Force to "take some bearings" and look at what its priorities ought to be for the coming years. The

general chartered a new study called *Air Force 2025* to look at “alternative futures...and possible changes in doctrine” (35:22).

To effectively look ahead and plan for the future, we must understand the past. Much has been written about the importance of doctrine and the correlation of concise, meaningful doctrine to the success and even survival of military forces. Air power doctrine is often discussed in a theoretical, broad sense. Often we hear doctrine referred to in the employment mode, as in tactical and strategic doctrine. Such narrowly-defined classifications of doctrine help to better identify the mission. They address the use of aircraft in specific roles. Strategic bombing, air-to-air combat, close air support, and airlift doctrine have been addressed since their implementation, but air refueling doctrine has yet to be published.

Air Force doctrine represents (or should represent) the apex of our thinking about the best ways to use airpower. It is our “theory of victory” (12:51). The absence of written operational air refueling doctrine, in either a stand-alone manual or combined with strategic airlift in an air mobility doctrine, is troublesome. The deficiency highlights the need for increased awareness of the contributions of air refueling and the creation of concise doctrine. The contributions to force enhancement provided by air refueling, and the 70 years of lessons learned from using air refueling must be preserved. This paper will answer the question, following a systematic approach, how should operational air refueling doctrine be written? Detailed historical examples (experiences) will be used to

illustrate enhancements to several diverse air missions. These experiences, once analyzed, are the source of concepts that eventually result in doctrine.

Description of the Problem

Defining doctrine is an obstacle in itself. Webster defines doctrine as “something taught, as the principles or creed of a religion; tenet or tenets; belief; dogma” (37:429). The definition may seem straight forward until the reader attempts to sort through examples of doctrine that range from the simple to the complex. Often philosophical discussions regarding doctrine alienate those whose inputs are most needed. Illustrating clearly what doctrine is, what doctrine leads to, and why it is important to codify, although challenging, lies at the heart of the problem.

Little has been written about air refueling except as a side note to the missions it supports. Air refueling doctrine does not exist in any of the newly re-designated Air Force Doctrine Document (AFDD) series. Doctrine for airlift operations, one of the five missions along with air refueling considered a crucial force enhancement mission, is well documented in AFDD-30, *Airlift Operations*. AFDD-30 “provides Air Force doctrine for airlift operations and supports basic air and space doctrine” (6:1). Although only 23 pages in length, AFDD-30 is a comprehensive document that “focuses on how airlift assets can be organized, trained, equipped, and operated to conduct airlift operations” (6:1).

Tankers make a vital contribution to the Air Force "Global Reach, Global Power" strategy. The absence of specific air refueling doctrine contributes to an incomplete understanding of the many contributions of air refueling to air power. The Air Force, according to General Fogleman, must "avoid attempts to package airpower into neat little stovepipes based on yesterday's thinking" and must draw away from such obsolescent concepts as "strategic" and "tactical" airpower (35:23).

Impact Analysis

Without clear, concise, functional, documented air refueling doctrine, the problem of accurately estimating the utility and criticality of air refueling to the efficient, effective use of air power will continue. The iron curtain fell relatively quickly. Just as quickly tankers transitioned from their primary mission of supporting bombers in the Single Integrated Operational Plan (SIOP) to providing for the global reach of almost every type of aircraft in the inventory (23,24). To respond to the need to global power, the tanker mission is necessary to provide range enhancement through air refueling. "Air refueling capability ensures that the unique flexibility of air power (concentration of power quickly at any point on the globe against any facet of an enemy's power) is a reality rather than an abstract concept" (8:189).

The absence of concise operational doctrine, coupled with an incomplete understanding of the enhancements and limitations of air refueling support, degrades operational effectiveness and may result in failure of the mission.

The symbolic relationship of the bomber and tanker is a concise illustration of the need to think about defense not in terms of weapons but at the very least in terms of weapon systems, to realize why tooth and tail are one fighting unit, as in any effective dragon. The bomber is useless without the tanker. It cannot make it to the target. It does no good to spend millions on bombers and not have sufficient tankers, as the British found in the Falklands. (17:214)

Background

The organization of men and machines into military forces does not necessarily mean that they are equipped and trained for the accomplishment, if necessary, of decisive action in war. For this, the discipline of a coherent body of thought appears to be indispensable. (38:171)

Although a “coherent body of thought” does not appear in the writings of air power doctrine specifically on air refueling, doctrine from many other facets of air power has been documented. In numerous efforts, airmen, historians, and academic researchers (and at times combinations of these) have produced volumes of doctrine. The use of air power was subjected to a variety of twists in employment over the years. Variations range from the dominating SAC nuclear strategy of nearly 40 years to “Global Reach,” which demonstrated how air refueling enabled C-5s to fly directly to Somalia loaded with time-sensitive armored vehicles for the Army. Documentation describing how air refueling was employed throughout the evolution of air power can provide valuable insights and lessons. Receiver aircraft rely on air refueling for the range to fly anywhere in the world. Increased range reduces reliance on the enroute support structure. The value of this flexibility and responsiveness to the military has not diminished in the post

cold war era. Documenting the historic lessons and creating sound doctrine will enable the Air Force to continue providing the necessary air refueling support to its own aircraft as well as those of the Navy, Marines, and allies who depend on this valuable but limited commodity.

Integral Issues and Factors

Most references to air refueling lie in writings that focus on a specific weapon system (bomber, fighter, airlifter) and mention the use of air refueling briefly. For instance, information pertaining to the application of air refueling in the 1950s and 1960s, is found in the bomber archives. Contributions to tactical fighter aircraft were made during operations in Vietnam, yet little mention is made in writings on the air campaign on combat support aircraft.

Some argue that air refueling has not “evolved” over time, but rather found uses “whenever and wherever commanders and planners have become aware of the advantages of aerial refueling for employment of their forces” (20:18). In some form or another, air refueling has stood poised to enhance air power. Military leaders and decision makers, not fully aware of the critical contribution air refueling could provide during the planning stage, have frequently adapted air refueling to enhance their missions. Had commanders been fully aware of air refueling enhancements from the outset, a smoother integration would have occurred resulting in more optimum results (16,36).

The many successes of air refueling helped to foster a false sense of security. The assumption that there is an unlimited supply of tanker support and capability for all aircraft requiring air refueling often results in shortfalls and limitations during exercises and operations. The Navy and Marines felt slighted during the Gulf War when denied what they felt was their fair share of the limited theater tanker support (39:115). Perhaps the focus on the ends instead of the means has contributed to the oversight of air refueling contributions to air power.

It is easy to consider only a single enhancement to a particular piece of the air power pie, and overlook the many other missions air refueling supports simultaneously. The focus of the doctrine writer must not be limited. If doctrine is used to design and structure the air refueling force, balancing tankers against other types of aircraft is a key concern. "The capacity and flexibility issue remains important and is directly related to the number and types of aircraft that must be refueled" (8:190). Joint planning must accompany any effort in producing viable doctrine.

Plan of Attack

The intention of this paper is to describe the current state of air refueling doctrine and suggest a systematic approach for the establishment of operational air refueling doctrine using historical experience. These investigative questions will serve to outline the paper:

- What is doctrine? Is there a way to "de-shroud" the mystery of doctrine terminology and identify examples of doctrine we are familiar with? The literature review in chapter two will serve to help answer these questions.
- What does doctrine lead to? While describing the doctrine development process, the use of air refueling examples will serve to illustrate various uses of doctrine.
- If there is a need for published air refueling doctrine, how can this be done within our administrative establishment?
- How does the doctrine development process work? Chapter three will apply a "doctrine process" model to answer this question.
- What specific actions should now be taken to produce an air refueling doctrine document? Chapter four concludes that the Air Force can benefit from an air refueling doctrine document and lists specific recommendations for establishing the air refueling doctrine process, classifying the doctrine, and identifying contributing elements to the process.

II. Doctrine Defined

The Air Force has the responsibility to deter conflict and preserve peace by maintaining aerospace forces that are capable and ready. If deterrence should fail, then the Air Force must be ready to deploy, employ, and sustain these forces with the aim of ultimately prevailing in combat. Yet, the history of warfare has shown that unless military forces are guided by appropriate doctrine, even superior numbers and advanced weapons are no guarantee of victory (1:2).

For many of us, doctrine is an ambiguous, even esoteric, subject. When we discuss doctrine, often the conversation becomes shrouded in a kind of semantic fog that only academicians seem to be able to penetrate. Unfortunately, semantic arguments obscure relevant issues, issues that only doctrine addresses. Simply stated, doctrine answers such questions as: What do we believe? Why do we believe what we do? and perhaps most important of all, What should we do now? (1:2).

Doctrine is found in various forms at various levels. The most general, philosophical doctrine is normally provided by the highest management levels in an organization. For example, the National Military Strategy (NMS), published by the Chairman of the Joint Chiefs of Staff, is derived from the national security strategy and “describes the critical role which the Armed Forces will play in helping to achieve our Nation’s objectives” (10:1). NMS is a report from the CJCS that answers the simple questions, what security challenges face the US, why these factors are challenges, and

how the military and the nation will face these challenges. The document describes the fundamental purpose of the Armed Forces and their plans to meet security challenges. The distinction between strategy and doctrine is often ambiguous.

At the other end of the spectrum is more specific, detailed doctrine, often found in field manuals. Tactical, operational doctrine guides the soldier, sailor, or airman on how to best accomplish a task. This doctrine is the field application of the “lessons learned.” Thus, doctrine is a guide for the exercise of professional judgment rather than a set of rules to be followed mechanically. It is the starting point for solving contemporary problems (7:vii).

Colonel Dennis Drew, former director for research, Air University Center for Aerospace Doctrine, Research, and Education (CADRE), states “the word doctrine conjures up confusion and consternation.” He defines military doctrine as “what is officially believed and taught about the best way to conduct military affairs” (26:xi). The definition implies a thought process, a comparing of alternatives, perhaps through discussion and debate. The use of “officially believed” indicates that various organizational levels may contribute to the process (26:xii).

What is officially believed is reflected not only in “doctrinal documents” but also in policy decisions, budgets, and plans for the future. There is no requirement for doctrine to be the result of a long, exhaustive period of contemplation. It can be the result of a spontaneous reaction to a tactical situation that has a positive outcome. It can be the by-product of an extensive economic analysis, a trusty heuristic or just the application of common sense. It can even be devastatingly wrong. It still comes out doctrine. (26:xii)

Former Air Force Chief of Staff General Merrill A. McPeak said of doctrine, “Doctrine is important because it provides the framework for understanding how to apply military power. It is what history has taught us works in war, as well as what does not”

(7:v). The introduction to AFM 1-1 states:

Aerospace doctrine is, simply defined, what we hold true about aerospace power and the best way to do a job in the Air Force. It is based on experience, our own and that of others. Doctrine is what we have learned about aerospace power and its application since the dawn of powered flight. (7:xi)

As a working definition, Joint Chiefs of Staff (JCS) Publication 1-02, *Dictionary of Military and Associated Terms*, states that doctrine is the “fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application.” (11:118).

Terminology

Two types of doctrine often referred to are *basic* and *operational* doctrine. It is necessary to establish exactly what is meant by these terms, and to show that doctrine developed prior to the establishment of these definitions does in fact conform to them.

According to a prominent Air Force doctrine historian, Frank Futrell, the term *basic doctrine* appeared in 1940, when it was applied by the Army Air Forces (AAF) to Field Manual (FM) 1-5, *Employment of the Aviation of the Army* (13:95). It stated that basic doctrine establishes fundamental principles that describe and guide the proper use of aerospace forces in war. Basic doctrine, the foundation of all aerospace doctrine,

provides broad, enduring guidance which should be used when deciding how air forces should be organized, trained, equipped, employed, and sustained. Basic doctrine is the cornerstone and provides the framework from which the Air Force develops operational and tactical doctrine (8:274).

Operational doctrine as a term appears later than basic doctrine. In the 1930s, when airmen began to describe air doctrine, they had no definition of the term *operational* in the modern sense of that expression. One of the earliest uses of the term meant that "the activity is in operation," in the sense of ongoing (27:22). In the modern sense, operational doctrine establishes principles that guide the use of aerospace forces in campaigns and major operations. It examines relationships among objectives, forces, environments, and actions to ensure that aerospace operations contribute to achieving assigned objectives (8:296).

Early Doctrine Efforts

The Air Corps issued its first doctrine publication in 1926, after spending almost eight years working on the problem of describing what aviation could be expected to do in war (27:23). The War Department, dominated by ground combat arms officers, prepared this publication, which appeared as Training Regulation (TR) 440-15, *Fundamental Principles for the Employment of the Air Service*, on 26 January 1926 (13:50). The fundamental doctrine "permitted the airmen to aid the ground forces to gain decisive success, with some recognition of the need for special missions at a great

distance from the ground forces" (13:50). The publication, revised in 1935, served as the doctrine of Army Aviation from 1926 to 1940.

15 April 1940, the Air Corps published its first doctrine manual, FM 1-5, *Employment of the Aviation of the Army*. Written under the guidance of Lieutenant Colonel Carl Spaatz, it was intended to be Air Corps basic doctrine. This manual replaced interwar training regulations that had sufficed for doctrine publications from 1926 to 1940 (13:95).

Doctrine Development in the Air Force, 1941-1955

The next doctrine development came during the North African campaign of 1942-43, when the AAF realized it had gone to North Africa "with an abundance of ignorance" regarding tactical airpower (27:23). At General Dwight D. Eisenhower's direction, with input from the Royal Air Force and senior AAF airmen, FM 100-20, *Command and Employment of Air Power*, dated 21 July 1943, was produced. This publication, based on the experience of the North African air campaign, served as the Air Force's basic doctrine manual through the Korean War. This manual focused on the tactical air forces and support of theater combat operations (14:137).

Before the Air Force separated from the Army, it formed the Air University at Maxwell AFB. Air University (AU) was identified as the doctrine development and education organization for the service in the postwar world (27:24). Three categories of doctrine--basic, operational, and tactical doctrine--were to be developed and taught by the

Air War College, Air Command and Staff School, and the Air Tactical School, respectively (13:349-51).

After extensive problems and numerous rewrites, AFM 1-2, *United States Air Force Basic Doctrine*, dated March 1953, was pushed through the Air Force Council. General Hoyt S. Vandenberg expressed the view that "basic air doctrine evolves from experience gained in war and from analysis of the continuing impact of new weapon systems on warfare. The dynamic and constant changes in new weapons make periodic substantive review of this doctrine necessary" (13:393).

The introduction of the term *aerospace power* in lieu of *airpower* in the 1959 version of AFM 1-2, including the idea that "aerospace" as an operational medium was everything above the earth's surface, was a major step by the Air Force towards "capturing" the new arena of space as its legitimate operational realm (27:31).

In March 1963, with guidance from Air Force Secretary Eugene M. Zuckert, General Curtis E. LeMay, chief of staff of the Air Force, set in motion the most far-reaching study and reconsideration of the Air Force that had been undertaken since the formulation of AWPD-1 (14:228-35). This effort, headed by General Bernard Schreiber of Air Force Systems Command, was identified as Project Forecast (14:228). Project Forecast laid the groundwork for the development of Air Force technology into the 1980s (27:31). Zuckert conceived the idea that Air Force doctrine must be written to support national policy and strategy, a different concept from a purely aerospace power doctrine

based on airpower theory, rooted in operational experience, and reflective of the capabilities and limitations of aerospace forces in peace and in war (14:230-31).

In August 1964, the first AFM 1-1, *United States Air Force Basic Doctrine*, appeared with a clearly stated source for its content. The new manual held that basic doctrine evolves through the continuing analysis and testing of military operations in the light of national objective and the changing military environment (7:i).

Doctrine Today: 1980-Present

AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, published in 1984, was accomplished in the Air Staff. However, "the lack of any meaningful continuity, historical knowledge and skill, or operational expertise above cockpit level" resulted in serious problems due to the "absence of an intellectual environment such as that of ACTS" (27:34).

The current AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, was issued in March 1992. Volume 1 of this new doctrine manual contains a concise statement of basic doctrine. This volume is the "bare-bones" (only 20 pages) discussion of basic aerospace doctrine (5:19). Volume 2 is a set of essays related to the doctrinal statements in Volume 1, supporting basic doctrine. It is "experience-based, systematic, logically organized, and it encompasses all of the principal concerns of Air Force doctrine, including organizing, training, equipping, and educating the force" (27:36).

Air Force Manual (AFM) 1-1 tells us that “doctrine should be alive, growing, evolving, and maturing. New experiences, reinterpretations of former experiences, advances in technology, changes in threats, and cultural changes can all require alterations to parts of our doctrine even as other parts remain constant. If we allow our thinking about aerospace power to stagnate, our doctrine can become dogma” (7:vii). We are accustomed to seeing doctrine grow, evolve, and mature, particularly where doctrine applies to what we care most about, our traditional roles and missions in the mainstream of the Air Force. We seem to have more difficulty, however, with expanding doctrine to other roles and missions (3:6-7).

Chapter 2 of AFM 1-1, The Nature of Aerospace Power, indicates that most aerospace forces can perform multiple roles and missions and assigns new definitions based on objectives rather than platforms or weapons. One of the four basic roles, force enhancement, is where airlift and air refueling mission is categorized. These missions increase the capabilities of both aerospace and surface forces to perform their own missions, but they do not apply firepower on the main target set (5:21).

In the third section of chapter 3, AFM 1-1 deals with orchestrating the roles and missions of aerospace forces. It describes the force enhancement role as a vital role by “multiplying the combat effectiveness through its transportation, refueling, warning and control, and electromagnetic combat missions” (5:23). In some situations, “force enhancement may be the major contribution aerospace forces make to a campaign” (7:13). The one paragraph dedicated specifically to air refueling in volume one states

“The ability of aerospace power to concentrate force anywhere against any facet of the enemy may depend on sufficient air refueling capability” (7:14). Measuring the sufficiency of air refueling capability should be based on productive employment of tankers which should be defined in doctrine. Since we do not have written operational air refueling doctrine, it is difficult to assess sufficient capability or inefficient employment.

Carl Builder suggests, in *The Icarus Syndrome*, that the Air Force has neglected airpower theory as the basis for its mission or purpose (4:xvii). According to Builder, this neglect of airpower theory, from which doctrine should flow, has also impaired the ability of the Air Force to write sound doctrine, particularly operational doctrine. The Air Force has suffered from a “fear of finding itself committed doctrinally to more than it can in fact deliver” (27:22). As a result of this concern, the Air Force has been reluctant to articulate what it can do for each of the other services.

Today the Air Force faces integration challenges in an increasingly joint world. Air Force leadership must be prepared to commit fully its capabilities and resources to the theater commander, the ground component commander, and the naval component commander. How effectively the Air Force “believes it can do those things to which it does commit, and what factors will limit or impair its ability to live up to those commitments, is what operational doctrine should be about” (27:38).

III. A Process for Developing Doctrine

With a more complete understanding of what doctrine is, the usefulness of a comprehensive operational doctrine document dedicated to air refueling becomes more apparent. But can a systematic approach be taken to develop such a document? Although the established bureaucratic process for producing doctrine may lack a “systematic intellectual process,” we still have viable means of producing this guidance (12:42). Using a doctrine process model suggested by Colonel Dennis M. Drew, USAF, Retired, in an article entitled “Inventing a Doctrine Process,” we can insert our air refueling examples in the model and suggest an approach to develop dedicated air refueling doctrine.

AFPD-1013 establishes the responsibilities for doctrine policy, development, and education. AFI 10-1301 establishes the system for doctrine development. Additionally, the AFDC has their own operating instructions that detail a process that is very similar to Drew’s model.

Drew offers an approach to the development of doctrine, much like the steps to completing a research project. Figure 1 describes the steps which can be used to guide the development of doctrine. A process that responds to the fundamental research question, “What is the best way to use airpower?” (12:44). The steps in the process are not equal in impact and effort. The first three steps will be covered in depth in the historic factors impacting air refueling section (page 20).

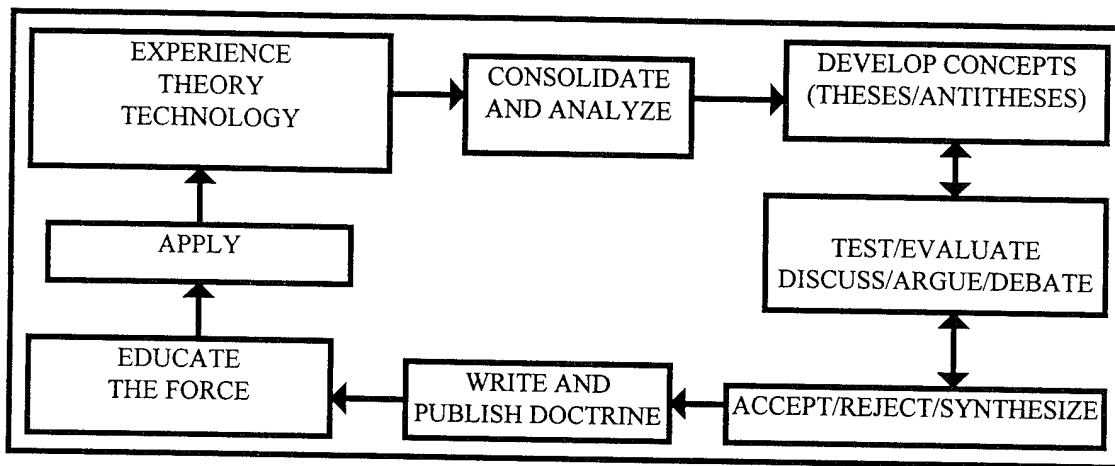


Figure 1. The Doctrine Process

Devise a Research Plan

The foundation of doctrine is history. It serves as the primary source of material for writers of doctrine (12:44). The first step then, represented by the upper-left corner of Figure 1, requires an exploration of historic references. "This effort must go far beyond simple library research, extending into the often overlooked experience of exercises, maneuvers, and perhaps even computer war games and simulations" (12:45).

One of the best sources of "lessons learned" is the after-action reports required by planners and senior staff officers following an exercise or operation. These reports, often lacking in detail and biased by a single source, serve as a primary means of preserving valuable information. After 50 years of working with doctrine Major General I. B. Holley, Jr., USAFR, Retired, stated "my observation is that the weak link in the process of generating doctrine is the paucity of well-prepared after-action reports" (18:20).

Although past experience is a guide to future action, it is not infallible. We should not grow complacent from the many successful lessons from Desert Storm. A quotation from Giulio Douhet's *Command of the Air* suggests why we should not be lulled into complacency: "Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the change occurs. In this period of rapid transition from one form to another, those who daringly take to the new road first will enjoy the incalculable advantages of the new means of war over the old" (11:30).

The research planner must consider advances in technology that may have a significant impact on future capabilities. Had the Air Force and Navy discussed the advantages of an interoperable refueling system, multi-point design considerations could have resulted in increased integration of land-based tankers.

Gather and Analyze the Data

Gathering the historical, theoretical, and technological data concerning air refueling is a significant task. If the task is not performed correctly, the purpose of the process can be defeated. A common occurrence is predisposition, "gathering only evidence that supports preconceived concepts about the subject at hand" (12:45). Predisposition is a concern when we examine a command that is the single manager of tanker resources. When SAC controlled the tankers, the first priority for tanker employment was support of strategic bombers. AMC is the current single manager for all

KC-10 and KC-135 air refueling operations (AFI 11-221). It is essential that ACC as well as other commands and services not be slighted. The researcher must have a full understanding of air refueling doctrine and represent the concerns of the tanker and all receivers. "If the evidence is stacked in support of preconceived notions, the effort to evaluate and analyze the evidence becomes skewed at best, worthless at worst" (12:45).

After gathering the evidence and consolidating it in a usable format, the material must be evaluated for its pertinence. Technology may impact the relevance of some evidence. For example, changes in C-141 Station Keeping Equipment (SKE) procedures, eliminating 180 degree turns while in formation with the tanker, impact greatly how air refueling will be employed during certain operations. This example illustrates the necessity to analyze the technology/methods of both the receiver as well as the tanker. The variety of receivers makes this task especially difficult for the tanker doctrine researcher. Therefore, it is essential to include receiver participation in the analyzing of data and concepts on a continuous basis.

Historic Factors Impacting Air Refueling. History provides several examples that illustrates how air refueling supports aerospace doctrine. Understanding how these events contribute to the enhancement of aerospace power is essential if we are to employ our air resources effectively.

The employment of air refueling demonstrates the flexibility/versatility and synergy tenets of aerospace power as described in AFM 1-1. Benefits to force enhancement provided by the proper application of air refueling resources are described

throughout the following pages. These historical experiences provide proof of what has worked and what has not worked. “Experience carries us beyond the visions and speculations of theorists. Actual experience reveals that which is practical” (18:8). Capturing these lessons in a useable document is the challenge for doctrine writers if aerospace power is to fully exploit contributions of air refueling.

Although many factors have influenced how tankers are currently employed, it is important to understand the impact of four major events and how these events provide a source of experience that should result in developed concepts. Analyzing these events is necessary to understand the totality of contributions provided by air refueling. They illustrate how air refueling has enhanced capabilities, changed employment strategy, and has overcome numerous constraints. While reviewing these four historic events (experiences), concepts that form the basis for operational air refueling doctrine should emerge.

- Flight of the “Question Mark”
- Strategic Air Command and the Intercontinental Bomber
- Tactical Air Operations in Southeast Asia
- Operation Nickel Grass, The Israeli Airlift of 1973

Flight of the “Question Mark.” Perhaps the most famous air refueling event of the pioneer era was the 7 January 1929 flight of the “Question Mark.” The crew included Major Carl Spaatz, Captain Ira Eaker, Lieutenant Elwood Quesada, Lieutenant Harry Halverson and mechanic Roy Hooe. Using a modified Atlantic (Fokker) C-2A, the

crew of the "Question Mark" stayed aloft for a record 150 hours, 40 minutes and 15 seconds. The flight tested the practical value of inflight refueling and aircraft endurance (31:2). In addition to setting the endurance record, the flight included other significant events:

- Taking off with only 100 gallons of fuel, creating a requirement for air refueling.
- Traveling over 11,000 miles, demonstrating increased radius capabilities.
- Making a total of 37 air refueling contacts, four hours of "hookup" time, demonstrating the reliability of air refueling.
- Accomplishing several night air refuelings, demonstrating that air refueling was not limited to daylight operations (31:2).

The crew of the "Question Mark" believed that the utility of air refueling was proven practical and possessed both commercial and military advantages. Major Spaatz stated that "from a military standpoint the successful demonstration of refueling means that bombing planes can now take off with heavy loads of bombs and little gasoline, refuel ... and continue to a more distant objective than would otherwise have been possible" (31:3). These concepts forge the basis of how air refueling enhances aerospace power. Air refueling doctrine was born.

The US Army discontinued experimentation with air refueling after the flight of the "Question Mark." Lieutenant Colonel Dennis Ryan, author of numerous writings concerning air refueling, stated that two factors led to the discontinuance: (1) the flight demonstrated that long-distance travel was now made possible and (2) the air refueling

concept itself had been proven successful, and no further experimentation was necessary (31:13).

SAC and the Intercontinental Bomber. The Strategic Air Command was established on 21 March 1946 specifically to deliver nuclear weapons against the Soviet Union (or other potential aggressors in time of war) (30:xi). The B-29 was the only aircraft capable of carrying the atomic bomb and became the backbone of the newly formed command (30:8). The B-29s and improved B-50s lacked the range to strike deep in Soviet targets and return. The only intercontinental bomber that the Air Force had in prospect was the giant B-36. The B-36 was large and appeared to be relatively slow, but it was the only aircraft that could strike Soviet targets from bases in the United States. In 1946, Boeing's B-52 won the design contest for an intercontinental jet bomber. But, with the requirement for built-in intercontinental range, the B-52 threatened to exceed the size of the monstrous B-36 (14:232). Recognizing the shortfall in global range, then Colonel Dale O. Smith suggested in 1951 that the Air Force might prepare its crews to fly one-way atomic combat missions. Smith suggested that crews would have a good chance to evade and survive (14:233).

In September 1947, General Spaatz formed a Heavy Bombardment Committee in an effort to clear up the indecision regarding the strategic bomber program. The Heavy Bombardment Committee recognized the most practical way to extend the range of existing medium bombers and to lighten the design weight of the proposed intercontinental B-52 jet bomber was to develop equipment and techniques for air-to-air

refueling of bombers from specially-equipped tankers. At sessions held on 27-30 January 1948, the USAF Aircraft and Weapons Board accepted the Heavy Bombardment Committee's recommendations that air-to-air refueling be developed as a matter of first priority, and Spaatz formally approved them on 3 March 1948 (14:233).

The decision to develop air refueling on a large scale was directly attributed to the shortfall in range of existing intercontinental strategic bombers. Range, therefore, is a primary enhancement principle provided by air refueling.

The method of refueling, flying boom/receptacle or probe/drogue would logically reflect the needs of the receiver being serviced. Just ten days after Boeing started testing the British in-flight refueling system, Air Force Materiel Command asked the company to proceed immediately with the development of an American air refueling method, the flying boom (32:11). In May of 1949, HQ USAF ordered that forty B-29s be converted to flying boom-type tankers and redesignated KB-29Ps.

In July of 1951, Boeing delivered the first KC-97E to MacDill AFB, Florida. Outfitted with a flying boom and loaded with fuel tanks, the four engine, propeller-driven KC-97 could fly fast enough to match the minimum speed of the B-47. It transformed the B-47 into an intercontinental bomber (30:26).

The KC-97G Stratofreighter, the first C-97 model converted to a tanker-transport, proved useful as a dual-role aircraft. The utility of hauling passengers, cargo, or fuel promoted the air power tenets of flexibility and responsiveness. Two tenets of aerospace power, flexibility and versatility, are provided by a tanker that can also provide airlift.

However, using tankers to solve shortfalls in airlift is a not a good example of two other tenets, priority and balance. AFM 1-1 addresses priorities of commanders stating "Air commanders should be alert for the potential diversion of aerospace forces to missions of marginal importance" (7:8). The KC-135 was not designed or funded to be an augmentation to airlift. The decision to use a limited air refueling resource (KC-135s) to augment airlift, must be made with a full understanding of the long-term effects on the fleet.

Preparing for the arrival of the B-52, HQ USAF tested both the flying boom and the probe and drogue methods behind a KC-97. SAC favored incorporating equipment for the flying boom for the new bomber (32:20). In May 1954, USAF announced a turbo-jet tanker was needed in order to meet air refueling needs of the expanding tactical and strategic aircraft fleet. The Boeing Company rolled out its 367-80 model aircraft, later known as the KC-135. The first production model KC-135 Stratotanker rolled off the assembly line in June 1954 (32:20).

By 1957, Soviet Union advancements in intercontinental ballistic missiles prompted a change in the operations of bomber and tanker aircraft. SAC placed one third of the forces on a ground alert status, prepared to provide an effective and immediate retaliatory strike force (30:49). Aircraft were loaded with weapons and crews were standing by for immediate takeoff. This "alert" status remained until 27 September 1991, when President Bush ordered the nuclear bomber and tanker fleets off alert status (28:13). This era had a significant impact on the employment of tankers and doctrine of the time.

Supporting the SIOP was the highest priority. Little "excess" tanker capacity existed to significantly contribute to other aircraft with one third of the tankers on ground alert.

Tactical Air Operations in Southeast Asia. For the first time, SAC's KC-135s, operating under the single manager concept, proved their worth in the employment phase of combat operations. The missions of the "Yankee Team" tanker task force drew little fanfare at the time, but marked a turning point in the history of aerial warfare (19:104). The impact of KC-135 assets, integrated with tactical combat operations, forced a responsive change to air power doctrine. In October 1964, following the grounding of the PACAF KB-50 fleet due to corrosion, HQ USAF assigned responsibility of all air refueling to SAC (32:29).

Providing fuel to receivers when and where needed is the basic purpose of a tanker, a fact which SAC, the single manager of the entire USAF refueling force at the time, kept firmly in sight. Extending the range of tactical aircraft, giving them more time to press home attacks on targets, allowing equitable sharing of high risk missions by all fighter units, and bringing fighters safely back to base--all were dependent on the ability to furnish sufficient fuel at the right times and places (19:105).

American air supremacy in Southeast Asia enabled tankers to move rather freely with relatively little risk. Air supremacy was made possible by the additional fuel obtainable by airborne tactical aircraft. Tanker presence provided a different face for airpower. Air operations in Southeast Asia would have been drastically different without the enhancement of air refueling. "Without tankers, tactical air operations would have

been greatly complicated, hazardous in the extreme, and the result of the enormous extra efforts very meager, indeed” (19:106).

The Navy owned a limited organic air refueling capability during the Southeast Asian Conflict, and KC-135s provided refuelings to Navy aircraft on a number of occasions. Tests conducted with Marine aircraft in mid-1964 proved their compatibility with SAC tankers, and HQ SAC anticipated refueling Navy and Marine fighters on a regular basis in the future. Details of coordination, funding, and division of responsibility, proved to be obstacles in devising a suitable agreement for joint operations. Despite having formalized procedures, SAC tankers faced the operational necessity of refueling mainly carrier-based aircraft returning from missions over North Vietnam, short of fuel. KC-135s were permitted to provide emergency refuelings to save aircraft and crew members (19:18).

Because the Air Force was not in the business of seeking customers outside its branch of service, interoperability was not a concern. In the early 1970s, formal joint air refueling operations between the Air Force and the Navy was nonexistent. In 1981, realizing that interservice interoperability could enhance operations in both the Air Force and the Navy, a Memorandum of Understanding (MOU) was signed. The new MOU was to “provide mutually agreed parameters in the pursuit of improving Air Force and Navy interoperability and compatibility towards enhancement of our combined combat effectiveness” (31:16).

Several principles of war are clearly illustrated by the use of tankers in support of tactical air operations. As a force multiplier, the tanker promotes "economy of force." Economy of force is defined by AFM 1-1 as "creating usable mass by using minimum combat power on secondary objectives, make the fullest use of all forces available" (7:1). Mass, the "concentration of combat power at the decisive time and place," and maneuver, "placing the enemy in a position of disadvantage through the flexible application of combat power," are two more principles optimized by the use of air refueling (7:1).

Operation Nickel Grass, The Israeli Airlift of 1973. The US airlift in support of Israel in 1973 demonstrated the value added of refueling strategic airlift aircraft. When Egypt and Syria launched a surprise attack against Israel in October of 1973, the United States found itself coming to the defense of Israel alone. Allied nations, fearing retaliation by terrorist groups or an Arab boycott of oil, refused to permit over-flight of airspace or landing rights. Only Portugal allowed the use of Lajes AB in the Azores (26:341).

The resupply of critical war supplies was time sensitive and could not wait. Sealift support would require 30 days to generate and another 12 to 14 days of en route time. The small fleet of Israeli commercial airliners could not provide the volume needed, and American civil airliners refused to be involved in the operation. Deputy Secretary of Defense William Clements, Jr., said that if the United States could have found any other way to transport the material to Israel, it would not have used MAC. But there was no effective alternative (26:340).

Although airlifters did not utilize air refueling, the resupply operation played an important role in the development of airlift doctrine and future plans to use air refueling. At the time, the C-141 was not air refueling capable. The C-5s used in the operation, although designed to be air refueled, did not use their air refueling capability because of concerns over the aerodynamic impact on the wings. It was discovered later that air refueling would have been less stressful on the wings than the additional takeoffs and landings required (26:342).

Earlier arguments that an all-jet force decreased dependence on island bases were generally true, but the extra flexibility from air refueling would have paid big dividends (26:342). General Carlton, Commander-in-Chief of MAC, presented to Pentagon planners the air refueling advantages: more rapid worldwide response capability, heavier cargo, shorter closure times, reduced risk of terrorism, and reduced requirements for overseas base support (20:8). Operation Nickel Grass identified air refueling as a capability airlift aircraft needed to provide worldwide mobility.

Air refueling provides additional options (speed, range, and flexibility/versatility) to airlift planners faced with limited enroute support, indirect routing due to diplomatic clearances and over-flight restrictions. Air refueling increases the versatility of airlift by allowing increased allowable cabin loads resulting in a higher throughput and a decreased closure time. These factors are especially important in time-sensitive scenarios.

These examples of historic experiences with air refueling, once developed, result in concepts that serve as the foundation of operational doctrine. Although air refueling enhances the strategic bomber, tactical fighter, and airlifter in similar ways (providing range and increased payloads) the efficient employment of tankers in support of these operations differ.

Formulate and Evaluate Potential Answers to the Research Questions

Analysis of gathered data should generate new concepts or reinforce existing concepts (12:45). For example, analysis of data concerning the use of certain emitters and their effects on remaining undetected at certain ranges and altitudes may suggest changes to the employment and sizing of air strike packages. Some may disagree. The results of data may have different interpretations and even prove inconsequential. After careful analysis, conflicting concepts may emerge. This conflict strengthens the evaluation step, making the end product even more meaningful.

Whatever the results of the developed concepts, a process of testing and evaluating is required. The test actions can range from field testing to a more academic debate forum. Field testing would be used more for tactical doctrine than for basic doctrine. A perfect forum to field test tanker tactics is at the Air Mobility Warfare Center (AMWC), a reporting agency of Air Mobility Command. The Combat Aircrew Tactics Training (CATT) program is the nucleus for consolidating, developing, and training

airlift and tanker tactics. Any doctrine affecting tankers, tactical or basic, should be coordinated with the operational expertise of the personnel located in the center.

The AMWC is also home to the Air Mobility Operations Course (AMOC). This 2 week course educates hundreds of AMC personnel as well as customers on the business of air mobility. The cadre is staffed with knowledgeable airmen who are certified platform instructors, qualified to contribute to the testing and evaluating of doctrinal concepts. Developing and evaluating concepts requires a broad base of expertise and interests. These individuals would serve well to bridge the gap between the Air Staff doctrine writers trained in the bureaucratic process, and the operators in the field. The goal of this step of the process is to “examine concepts in-depth, compare, contrast, identify strengths and weaknesses, and modify” (12:46).

AFI 10-1301 sanctions the concept of “outside referral” for doctrine development. It recognizes that the doctrine writer relies on inputs from various agencies. Ideally, the practice should be included in a continuous rather than episodic process to avoid the inconsistencies of past doctrine efforts (12:52). This continuous process of review and renewal is essential if a viable product is desired.

Identify the Best Answer to the Research Question

If the testing and evaluation process is accomplished effectively, the end result should lead to “acceptance or rejection of concepts or the modification and synthesis of concepts that address the basic research question” (12:46). A sound, explicit, process

should result in solid and defensible concepts. The double-headed arrows in the model in Figure 1 “imply that the process is iterative and, although divided into discrete sections, are part and parcel of the same function” (12:46).

Write and Publish the Doctrine

Writing the actual doctrine comes late in the process, but planning for the writing is essential. There are many uses for doctrine and it can be written for a variety of audiences and uses. “Determining the primary purpose and the primary audience will affect not only how the doctrine is written, but to some extent what subjects are covered, how they are approached, and what data is sought” (12:46). The results of these decisions directly influence how the concepts will be advanced.

Although useful to the headquarters staff/action officer, a doctrine document reflecting the style and substance of the “budget justifying” format has limited utility outside the headquarters. What would better serve the Air Force, as well as the Navy and our allies, is a document similar to AFDD-30. A manual with the intention of educating airmen, both tankers and receivers, about the enhancements of air refueling would also “benefit people who are fighting the good fight within the Pentagon” (12:49). This end result should be clearly stated and outlined from the start.

In the USAF hierarchy of doctrine documents we have basic doctrine, operational doctrine, and tactical doctrine. Basic doctrine is AFM 1-1 and will be redesignated AFDD 1. Air refueling is addressed in AFM1-1 and will be addressed in AFDD 1.

Therefore, basic air refueling doctrine does exist. There is, however, no operational air refueling doctrine. Operational doctrine of old is the AFM 2- series pubs. Now, and in the future, operational level doctrine is every AFDD other than AFDD 1. Tactical level doctrine continues to be the MCM 3- series publications for each weapon system.

Educate the Force

The entire doctrine writing process has limited utility if the final product were published but ignored. The publication of doctrine must face the “education” challenge. Educating the force at the appropriate level of understanding and analysis is a huge task (12:49).

In the past, whether due to the style of writing or method of diffusion, doctrine manuals were rarely read, often not understood, and haphazardly applied (12,18,27). The Air Force system of professional military education has traditionally given doctrine limited attention (12:46). Educational efforts have changed in recent years in an attempt to teach the Air Force doctrine. Air University’s College of Aerospace Doctrine, Research, and Education (CADRE) has taken on the task of developing a comprehensive program of doctrine education (12:48).

In an Air War College research paper entitled “The Making of the Weakest Link,” Colonel Stephen German lists several examples of missed education opportunities within the PME context. He comments on the fact that wargaming exercises that make lofty assumptions that indicate a disturbing lack of knowledge regarding tanker employment.

Colonel German contends that a widespread misunderstanding of basic employment doctrine of the KC-135 is due largely to a lack of education in the Air Force. "There appears to be an absence of advocacy in the future maintenance of this resource [the KC-135] and the unique capabilities it brings to US and allied military force" (16:25). A general lack of advocacy and education concerning this vital resource is contributing to "The Making of the Weakest Link" (16:25).

Air Mobility Command can do more to propagate the doctrine educational process. Several courses taught at the AMWC lend themselves to teaching air refueling doctrine. The AMOC, CATT, and Director of Mobility Forces (DIRMOBFOR) courses, are all perfect targets of opportunity for disseminating doctrine information. The content of these courses already constitute in detail pieces of the basic and tactical doctrine pie. With a doctrine document containing the "big picture" of air refueling, each class could incorporate a training block dedicated to its contents.

The Airlift/Tanker Association, a non-profit organization that promotes the interests of airlift and tankers, conducts an annual professional development symposium during its annual convention. The forum is an excellent professional development opportunity for all airmen. Concepts, new and old, are discussed and often debated. In attendance are individuals of all ranks and services as well as civilian technical experts and retired military (representing a wealth of knowledge).

The AMWC sponsors, at least biannually, a tactics conference. This forum does a tremendous job of consolidating, presenting, and discussing concepts regarding tactical

doctrine. A unique advantage is the availability of an environment to discuss classified matters. This provides a much-needed interface of the various “field” experts. Tactical doctrine is guided by the classified tactical doctrine guidance of Multi Command Manual (MCM) 3-1, Vol. 22, *Tactical Employment, KC-135/KC-10*. All who attend increase their experience base by participating in the discussions and debates regarding tactical concepts.

Aircrews attending initial qualification training would benefit from a familiarization of doctrine concepts regarding their profession. Also, pilots attending receiver training courses could benefit by familiarizing themselves with air refueling doctrinal concepts. This grass roots approach may help in removing mystery from what it is we call doctrine. Not many new concepts need to be taught. The concepts are already taught in segments at various stages of an airman’s professional development. It would make sense to present a basic overall picture of how air refueling contributes to aerospace power, and what experiences led to our reliance on air refueling.

Apply the Doctrine

Outside the Pentagon, the application of written doctrine has been limited. “Such results are to be expected if one writes basic doctrine for use within the Pentagon, without any concerted educational program to teach it to the bulk of the force” (12:47). Without an extensive educational effort, the application of doctrine will be limited. Even while published doctrine is being revised, the application and education of doctrine concepts

should continue. The goal is to perpetuate a continuous process of development despite the episodic nature of the actual writing.

Implications of the Doctrine Development Process

The continuous cycle of doctrine development is the most obvious implication of the process; however, other implications are at least equally important (12:47). Doctrine development is a large task. Although the Air Force Doctrine Center is responsible for the writing of doctrine, everyone involved with air refueling has a vested interest in relevant doctrine documents. Participation of the numerous parties involved must be coordinated by the Air Force Doctrine Center. The process demands continuous change if the doctrine is to remain meaningful. A robust means of both generating and evaluating concepts, technologies, and even theories must be accomplished. This should be done at least annually to capture emerging concepts and coordinate the integration of technology.

The doctrine process model suggested by Colonel Drew provides an excellent blueprint for the creation and continuation of a meaningful air refueling doctrine document. The question is, what exactly should we make with this blueprint?

IV. Conclusion

Overview

Air refueling doctrine already exists. It impacts airmen in many ways. It is implicit in the education, training, and development of the air refueling professional. It is not readily apparent to many because it has not been preserved in an operational doctrine document. Our air refueling concepts must be preserved in doctrine. A well-written, operational air refueling doctrine document, designed to educate all airmen on the enhancements and limitations of air refueling, would greatly benefit the Air Force, as well as our sister services and allies.

Air refueling doctrine should be used to guide our decisions regarding tanker force sizing, future weapon acquisitions, and technology integration. Without doctrine to guide us we are “all thrust and no vector.” Too many decisions regarding the employment of tankers are made without understanding the ramifications. Gross assumptions concerning tanker capabilities and limitations are common throughout the hierarchy of the Air Force. These are problems that doctrine can help solve.

Recommendations

“The chief weakness of the current system of doctrine development is that there is no real system” (12:48). The task of producing and maintaining a much-needed air refueling doctrine document, although formidable, is certainly achievable. “The

publication of doctrine is episodic, but its development should be continuous” (12:47).

Figure 2 is a modification of the first doctrine process. The current doctrine process has not resulted in the production of operational air refueling doctrine. The illustration indicates that “we accept, teach, and apply new concepts even though we have no published new doctrine” (12:47). This is the situation we are faced with today. We lack written doctrine and rely on air refueling *informal doctrine* which are “beliefs that evolve constantly but have not been written, published, and officially sanctioned” (12:47).

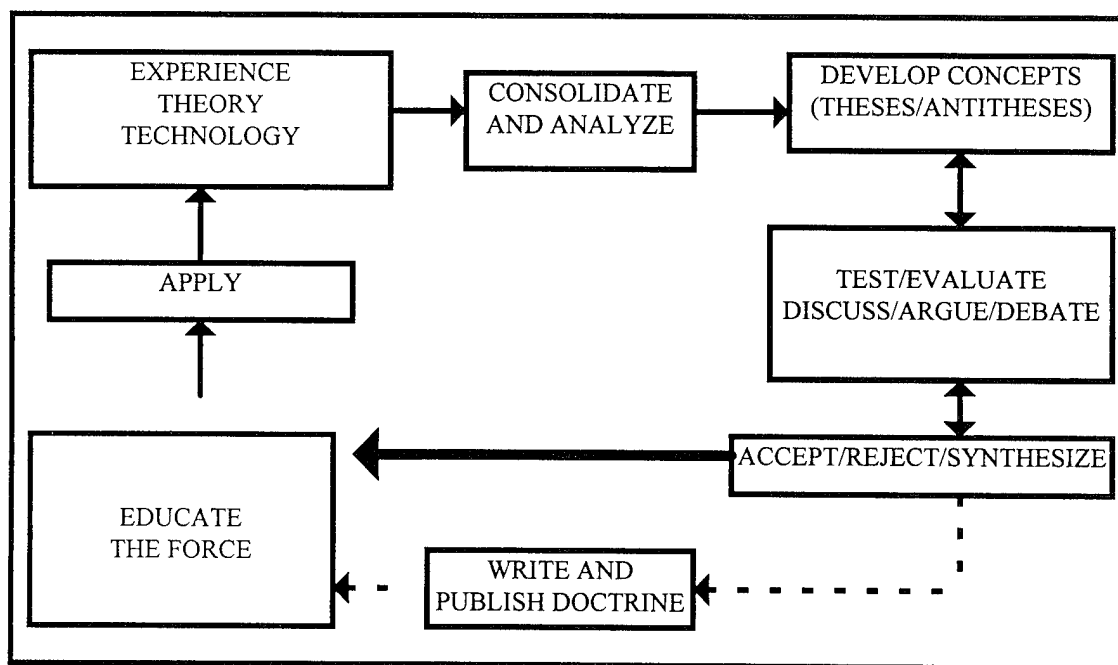


Figure 2. The Doctrine Process Modified

The Air Force Doctrine Center is the most obvious agency to assist in the air refueling doctrine development process. Many other valuable contributors must also support the continuous doctrine production process. Due to limited manning and experience levels within the Air Force Doctrine Center, contributions from outside agencies should not only be expected, but demanded. The following outline recommends specific actions, based on the doctrine process model, that would result in an air refueling doctrine document and a means to propagate air refueling awareness.

Consolidate and Analyze. A decision must be made on whom the end product should serve. Once the audience is identified, the style and format must target that audience. A fairly comprehensive tactical doctrine exists. This document, MCM 3-1, Vol. 22, *Tactical Employment, KC-135/KC-10*, serves to guide air refueling operations in the area of a threat. What is needed is an operational doctrine document that educates all those associated with air refueling on its enhancements and limitations.

Emphasis on events which helped shape today's employment of air refueling can focus on these areas: support of tactical operations (fighters, bombers, reconnaissance, surveillance, command and control), strategic movements (fighter drags), allied support, joint support (Navy/Marines), airbridge operations (airlift), special operations support, mission extension, and dual-use operations.

Develop, Test, and Evaluate Concepts. The format of AFDD-30, *Airlift Operations*, could serve as a model for the development of a statement of air refueling doctrine. Once a fairly well developed outline is constructed, a doctrine conference

would serve to consolidate the myriad of necessary inputs. Key participants involved with air refueling should attend to further develop the concepts in the draft. Contributing agencies that should be considered include HQ ACC, Air University (CADRE), HQ AETC, AMWC, ARC, HQ AF/XOOFM, HQ AF/XORM, HQ AMC/XO, Navy, PACAF, and USAFE. The Royal Air Force and other allied air forces could make valuable contributions as well as participants from the civilian community who have significant experience with air refueling like Boeing and McDonnell Douglas.

After explaining what is expected of the end product, an operational air refueling doctrine document, participants could break up into small work groups. Efforts should be directed at “brainstorming” concepts specific to the group. Concepts regarding air refueling doctrine should be gathered and discussed. The goal should be to capture as much information and “informal doctrine” as possible. Once the participants depart, the task of converting the amassed concepts begins. A small working group should then be tasked to contribute to writing, testing, and evaluating, the remaining assignment. The group could include representatives from Air Force Doctrine Center (OPR), HQ AF/XOXD, HQ AMC/ XPD, AMWC.

Write and Publish Doctrine. Air refueling doctrine should be a stand-alone document, much like AFDD-30. Any attempt to package airlift and air refueling doctrine in the same document under the “Air Mobility” title should be avoided. Although the two missions integrate to enhance “Air Mobility,” they are distinctly different. If the two

must be combined, there should be two separate sections that clearly illustrate their unique capabilities.

The Air Force Doctrine Center (OPR), in coordination with the condensed working group, would be responsible for the writing and publishing the new document. Individuals from HQ AMC and the AMWC should have to accomplish this assignment as more than an additional duty. Senior officer involvement would be required to get the process started and quality people assigned to the task. This core team should remain involved in the continuous cyclical process necessary to keep the document alive.

Promote Education Process. Integration of air refueling doctrine into all facets of PME should be pursued. Courses offered in Squadron Officer School, Air Command and Staff College, and Air War College can promote the study and application of doctrine principles. Faulty assumptions during wargaming exercises should be eliminated with a doctrine document that identifies realistic enhancements and limitations associated with air refueling. AETC can also integrate an operational air refueling doctrine orientation class during initial flight training for aircrew members.

AMC has a vested interest in promoting air refueling doctrine and can be instrumental in the process. Experts at the AMWC should be called on to participate in all stages of the doctrine process. Operational air refueling doctrine should be integrated in every course taught relating to air refueling. Staff instructors with the appropriate background should be involved with the formulation, testing, evaluating, writing, and educating steps of the doctrine process. The AMWC should be proactive in the call for

air refueling doctrine. Although the Air Force Doctrine Center should be responsible for the composition, AMC has the expertise necessary to produce a worthwhile document.

Suggested Areas for Further Development.

The intention of this paper is to illustrate the importance of developing a complete and detailed operational air refueling doctrine document. By defining doctrine, as well as the doctrine process, the implication is that many would benefit from a deliberate doctrine development process that results in the production of an air refueling doctrine document. In the process of identifying the need for basic air refueling doctrine, many questions remain.

Identify The Current Doctrine Process. What steps must be taken to produce an operational air refueling doctrine document within the guidelines of the current doctrine process?

Identify The Stakeholders. Who benefits most from an air refueling doctrine document? Who has a vested interest in seeing a viable air refueling force capable of meeting their air refueling needs? Who are the agencies and individuals that need to be involved in the doctrine development process and why?

Identify Areas Impacted By Air Refueling Doctrine. What publications and policies, Air Force as well as joint, will be affected by published air refueling doctrine? Besides educating airmen on the value of air refueling, how else should this doctrine document be used, i.e. weapon system acquisition, force structure, roles and missions?

Identify Where Air Refueling Doctrine Should Appear. How and where should the doctrine appear? Should it be combined with airlift doctrine in an air mobility doctrine document? Should it be included in a joint publication?

Summary

It is essential to recognize the importance of aerospace doctrine in the Air Force. Every decision made regarding the employment of our nations military resources should be founded in doctrine. Everyone is responsible to contribute to the doctrine process in some fashion. Contributions are made to the doctrine process by developing, educating, and applying doctrine concepts.

Air Force Chief of Staff General Ronald R. Fogleman provided his thoughts on the importance of understanding the totality of air power and how to employ it to support America's interests. The general told captains in the Air Force intern program that, "the Air Force has become too stove piped. We have fighter experts, bomber experts, mobility experts, space operators, intelligence analysts, etc." Fogleman acknowledged that "it's important for young officers to ground themselves in the basic skills of their specialty, particularly during their initial assignment, however, they also need to broaden their perspective and develop an appreciation for what other members of the Air Force team contribute to our combat capability." It is important for them "to understand how best to employ air power as part of the joint warfighting team" (2:1). Again, an

operational air refueling doctrine document could illustrate what contributions air refueling makes to air power.

General Fogleman stated that “air warriors” must be able to explain that “air power is the collection of unique military capabilities that control and exploit the air or space medium to gain a powerful advantage in time, mass, position, and awareness in pursuit of national security interests.” In the end, “the general said, “our Air Force provides the nation an economy-of-force capability that can be used to indicate concern, to deter, to defend, to compel, or to strike an adversary” (2:1).

As the Air Force enters the 21st century, Fogleman said, “We owe it to the American people to provide the full range of air and space forces necessary to underwrite this economy-of-force capability. We must provide the air warriors who know how to leverage this capability to fight and win our nation’s wars” (2:2).

Colonel German’s paper “The Making of the Weakest Link” illustrates growing concerns of the “endangered status” of the KC-135 and Air Force air refueling resources. (16:25). His description of “misplaced priorities complicating accomplishment of an important mission” regarding the management of the KC-135 fleet suggests many airmen are lacking in the education and guidance a well written air refueling doctrine document could provide (16:25). Creating operational air refueling doctrine and a doctrine process are necessary steps for the effective employment of this crucial force enhancement to aerospace power.

Bibliography

1. Air Command and Staff College Associate Program, "Seminar and Correspondence Lesson Book, Vol. 3. Version 10, 35/36A. Air University Press, Maxwell AFB AL, 1994.
2. Baldwin, Joe R. "Chief of Staff Seeking Air Warriors." www.dtic.mil:80/airforcelin...Apr96/an040896_08apr96_960320.html
3. Builder, Carl H. "Doctrinal Frontiers," Air Power Journal. 6-13, Vol. IX, No. 4, Air University Press, Maxwell AFB AL, Winter, 1995.
4. Builder, Carl H. The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the U.S. Air Force. California: RAND Corp, 1994.
5. Cichowski, Kurt A. Doctrine Matures Through a Storm: An Analysis of the New Air Force Manual 1-1. School of Advanced Airpower Studies, Air University, Maxwell AFB AL, June 1993.
6. Department of the Air Force. Airlift Operations. AFDD-30. Washington: HQ USAF, October 1995.
7. Department of the Air Force. Basic Aerospace Doctrine of the United States Air Force. AFM 1-1. Washington: HQ USAF, March 1992, vol. 1.
8. Department of the Air Force. Basic Aerospace Doctrine of the United States Air Force. AFM 1-1. Washington: HQ USAF, March 1992, vol. 2.
9. Department of Defense, Joint Chiefs of Staff. National Military Strategy of the United States of America, 1995. Washington: Office of the Joint Chiefs of Staff
10. Department of Defense, Joint Chiefs of Staff. Department of Defense Dictionary of Military and Associated Terms. Joint Pub 1-02 Washington: January 1990.
11. Douhet, Giulio. The Command of the Air. ed. Richard H. Kohn and Joseph P. Harahan, Washington: US Government Printing Office, 1983.
12. Drew, Dennis M. "Inventing a Doctrine Process." Air Power Journal. Vol. IX, No. 4, 42-52, Air University Press, Maxwell AFB AL, Winter, 1995.

13. Futrell, Robert F. Ideas, Concepts, Doctrine; vol 1. Maxwell AFB AL: Air University Press, 1971.
14. Futrell, Robert F. Ideas, Concepts, Doctrine; vol 2. Maxwell AFB AL: Air University Press, 1971.
15. Gant, Henry N. Deterrence in the Face of Explosive Peace, SAC Tankers Into the Twenty-first Century. Research Report No. AU-ARI-91-7. Maxwell AFB AL: Air University Press, August 1993.
16. German, Stephen C. The Making of the Weakest Link, Air War College, Air University, Maxwell AFB AL, April 1994.
17. Hadley, Arthur T. The Straw Giant. Random House, Inc, 1987.
18. Holley, I. B. Air Power Journal. Vol. IX, No. 4, 14-20, Air University Press, Maxwell AFB AL Winter, 1995.
19. Hopkins, Charles K. SAC Tanker Operations in the Southeast Asia War, Office of the Historian, Headquarters Strategic Air Command, Offutt AFB NE, 1979.
20. Kilingsworth, Paul, Keith Henry, Laura Melody and James Stucker. Tankers: Air Mobility Roles for the 1990s. CA: RAND Corp, Draft, DRR-913-AF/OSD, November 1994.
21. Lohide, Kurtis D. "Desert Storm's Siren Song" Air Power Journal. 42-52, Vol. IX, No. 4, Air University Press, Maxwell AFB AL, Winter 1995.
22. Lund, John, Ruth Berg, and Corinee Replogle. Project Air Force Analysis of the Air War in the Gulf: An Assessment of Strategic Airlift Operational Efficiency 27-28, California: RAND Corp, 1993.
23. Matthews, James K. General Hansford T. Johnson, Commander in Chief United States Transportation Command and Commander Air Mobility Command, An Oral History. Scott AFB IL, December 1992.
24. Matthews, James K. General Ronald R. Fogleman, Commander in Chief United States Transportation Command and Commander Air Mobility Command, An Oral History. Scott AFB IL, March 1995.
25. Menarchik, Douglas. Powerlift-Getting to Desert Storm: Strategic Transportation and Strategy in the New World Order. Connecticut: Praeger Publishers, 1993.

26. Miller, Charles E. Airlift Doctrine. Maxwell AFB AL: Air University Press, 1988.
27. Mowbray, James A. "Air Force Doctrine Problems; 1926-Present." Air Power Journal. Vol. IX, No. 4, 21-41, Air University Press, Maxwell AFB AL, 1995.
28. Muradian, Vago "Tankers: Why They're So Important-and Yet So Unappreciated," Air Force Times, No. 27, 12-19 (February 6, 1995).
29. Norwood, Scott J. Thunderbolts and Eggshells: Composite Air Operations During Desert Storm and Implications for USAF Doctrine and Force Structure. School of Advanced Airpower Studies, Air University, Maxwell AFB AL, September 1994.
30. Polmar, Norman and Timothy M. Laur. Strategic Air Command: People, Aircraft, and Missiles. Maryland: The Nautical & Aviation Publishing Company of America, 1990.
31. Ryan, Dennis K. Air Force Air Refueling for Naval Operations: History, Practice and Recommendations. Research Report No. AU-ARI-89-10. Maxwell AFB AL: Air University Press, August 1990.
32. Seventy Years of Strategic Air Refueling: 1918-1988, A Chronology, Office of the Historian, Headquarters Strategic Air Command, Offutt AFB NE, May 1990.
33. Shultz, Richard H. Jr. and Robert L. Pfaltzgraff Jr. The Future of Air Power in the Aftermath of the Gulf War. Maxwell AFB AL: Air University Press, 1992.
34. Swanborough, Gordon and Peter M. Bowers, United States Military Aircraft Since 1908, 101, London: Putnam, 1971.
35. Tirpak, John A. "The Air Force Today and Tomorrow," Air Force Magazine, vol. 79: 20-26 (January 1996).
36. Watts, Barry D. The Foundations of U.S. Air Doctrine, The Problem of Friction in War. Maxwell AFB AL: Air University Press, 1984.
37. Websters New World Dictionary of the American Language. Cleveland and New York: The World Publishing Company, 1966.
38. Westenhoff, Charles M. Military Air Power, The CADRE Digest of Air Power Opinions and Thoughts. Maxwell AFB AL: Air University Press, 1990.

39. Winnefeld, James A. and others. A League of Airmen: U.S. Air Power in the Gulf War. California: RAND Corp, 1994.

Vita

Captain Daniel J. Monahan was born on 7 May 1962 in State College, Pennsylvania. He graduated from Jacksonville Senior High School in 1980 and entered undergraduate studies at East Carolina University in Greenville, North Carolina. He graduated with a Bachelor of Arts degree in Political Science in June 1984. He received his commission on 20 June 1984 through the Air Force Reserve Officer Training Corps.

His first assignment was at Robins AFB as a KC-135 pilot. His second assignment was at March AFB as a 15AF command evaluator in the KC-135A/R/E. In 1993 he was selected for the Mobility Enhancement Crossflow Program to train in the C-141. He was assigned to McGuire AFB as a flight commander and upgraded to instructor pilot. In February 1995, he entered the Advanced Study of Air Mobility program at the Air Mobility Warfare Center, Fort Dix, New Jersey, sponsored by the Air Mobility Command and Air Force Institute of Technology. His follow-on assignment is to HQ AF/XOXD (doctrine office).

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13. ABSTRACT (Maximum 200 words) Without written operational air refueling doctrine, the difficulty of accurately estimating the utility and criticality of air refueling will continue. This paper describes the current state of air refueling doctrine and suggests a systematic approach for the establishment of a concise, dedicated, operational air refueling doctrine document. In an attempt to clarify mysterious doctrine terminology, working definitions and examples of doctrine are reviewed. Aerospace doctrine from 1941 to today is examined, illustrating how doctrine has evolved. A doctrine development process is suggested and air refueling historical experiences are analyzed in an attempt to develop basic doctrinal concepts. The doctrinal concepts derived (from the historical experiences) influence how tankers are employed today. A suggested doctrine development process is illustrated by applying a "doctrine process" model devised by Colonel Dennis Drew, USAF, Ret. Drew compares the doctrine development process in steps similar to those of written academic research and emphasizes the continuous nature of the doctrine process. The paper concludes that the Air Force can benefit from the creation of an operational air refueling doctrine document and makes specific recommendations for the establishment of an air refueling doctrine development process.				
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